Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claims 1 – 14 (Cancelled)

Claim 15 (Cancelled)

Claim 16 (Cancelled): ~~The method of claim 30, wherein said mixture further comprises an additive gas, wherein said additive gas comprises at least one member selected from the group consisting of:~~

~~a) helium;~~

~~b) hydrogen; and~~

~~c) mixtures thereof.~~

Claim 17 (Previously Presented): The method of claim 30, wherein said mixture further comprises a supplementary gas.

Claim 18 (Cancelled)

Claim 19 (Cancelled): ~~The method of claim 16, further comprising adjusting the composition of said mixture to optimize said mixture's convective heat transfer coefficient, as compared to the individual convective heat transfer coefficients of each component of said mixture.~~

Claim 20 (Currently Amended): The method of claim 30~~16~~, further comprising:

a) cooling said parts in a vessel, wherein said vessel comprises a gas stirring system; and

b) adjusting the composition of said mixture to obtain an average density of said mixture which is capable of being stirred by said stirring system, without having to make significant changes to said vessel.

Claim 21 (Currently Amended): The method of claim 30~~16~~, further comprising adjusting the composition of said mixture so that endothermic chemical reactions can occur between said absorbing gas and at least one other component of said mixture.

Claim 22 (Currently Amended): The method of claim 30~~16~~, wherein said absorbing gas comprises CO_2.

Claim 23 (Cancelled)

Claim 24 (Previously Presented): The method of claim 30, wherein the content of said absorbing gas in said mixture is between about 5% to about 100% of the total mixture volume.

Claim 25 (Previously Presented): The method of claim 24, wherein said content is between about 20% to about 80%.

Claim 26 (Previously Presented): The method of claim 30, wherein said gas mixture comprises a binary CO_2/He mixture, wherein the CO_2 content of said mixture is between about 30% to about 80% of the total mixture volume.

Claim 27 (Previously Presented): The method of claim 30, wherein said gas mixture comprises a binary CO_2/H_2 mixture, wherein the CO_2 content of said mixture is between about 30% to about 80% of the total mixture volume.

Claim 28 (Previously Presented): The method of claim 30, further comprising recycling said mixture wherein said recycling comprises:

a) recompressing said mixture prior to a subsequent use; and

b) processing said mixture to recover at least one component of said mixture, wherein said processing comprises at least one process selected from the group consisting of:

1) separating; and

2) purifying.

Claim 29 (Cancelled)

Claim 30 (Currently Amended): A method for rapidly cooling metal parts using a pressurized cooling gas mixture, wherein:
the cooling gas mixture comprises a) one or a plurality of infrared radiation absorbing gases selected from the group consisting of saturated hydrocarbons, unsaturated hydrocarbons, CO_2, CO, H_2O, NH_3, NO, N_2O, NO_2 and mixtures thereof and b) optionally an additive gas that comprises at least one member selected from the group consisting of helium, hydrogen and mixtures thereof;
the composition of said mixture is adjusted to obtain an average mixture density that is approximately the same as that of nitrogen;
adjusting the composition of said mixture to optimize said mixture's convective heat transfer coefficient, as compared to the individual convective heat transfer coefficients of each component of said mixture; and
the mixture has convective heat transfer properties superior to those of nitrogen in similar cooling conditions.

Claim 31 (Currently Amended): A method for rapidly cooling metal parts using a pressurized cooling gas mixture, wherein:

the cooling gas mixture comprises a) a content of from about 5% to about 80% by volume of one or a plurality of infrared radiation absorbing gases selected from the group comprising saturated hydrocarbons, unsaturated hydrocarbons, CO_2, CO, H_2O, NH_3, NO, N_2O, NO_2 and mixtures thereof and b) optionally an additive gas that

comprises at least one member selected from the group consisting of helium, hydrogen and mixtures thereof in order to improve the heat transfer to the part by combining radiative and convective heat transfer phenomena and to improve the convective heat transfer coefficient in comparison with conventional conditions of cooling under nitrogen;

adjusting the composition of said mixture to optimize said mixture's convective heat transfer coefficient, as compared to the individual convective heat transfer coefficients of each component of said mixture; and

the cooling gas further comprising an additive gas having a good convective heat transfer capability and selected from helium, hydrogen and mixtures thereof;

the composition of said cooling gas mixture being adjusted to obtain an average mixture density that is approximately the same as that of nitrogen.

Claim 32 (New): The method of claim 30, wherein said gas mixture comprises a binary mixture selected from a binary CO_2/He mixture and a binary CO_2/H_2 mixture, wherein the CO_2 content of each of these mixtures is between about 20% to about 80% of the total mixture volume.